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09/777,689	02/07/2001	Ji Hyun Hwang	MRE-08	3330

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EXAMINER	
JONES, JUDSON	

ART UNIT	PAPER NUMBER
2834	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/777,689	Applicant(s) HWANG ET AL.
	Examiner Judson H Jones	Art Unit 2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-20,23-26 and 28* is/are rejected.

7)☒ Claim(s) *3,21,22 and 27* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mould et al. 5,807,606 in view of Holliday 5,349,256, Ludwig et al. 5,449,961, Liebman et al. 6,262,503, Leuthen (of record), Tanaka 6,069,418, Senda et al. 6,437,481 B1 and Bacchi 5,053,685. Mould et al. discloses an X-Y gantry having a linear motor and a processor but does not disclose a temperature sensor attached to the linear motor, a heat sink, a cooling fan or an encoder. However Holliday teaches in column 11 lines 20-29 that magnets can be thermally demagnetized and need to be protected from heat. Since Holliday and Mould et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized cooling for a linear motor of a gantry in order to protect the motor from damage and to increase the efficiency of the motor. Mould et al. as modified by Holliday discloses the cooling system for a gantry having a linear motor but does not disclose a temperature sensor, a heat sink, a cooling fan or an encoder. Ludwig et al. teaches in column 4 lines 31 ½ to 45 ½ that a processor can be used to control the cooling of a dynamoelectric machine and teaches temperature sensors. Since Ludwig et al. and Mould as modified by Holliday are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a processor to control the cooling of a linear motor for a gantry in order to cool the motor more efficiently by supplying the precise amount of cooling fluid needed by the motor. Ludwig et al. also teaches cooling fans in

column 1 lines 24-26. Ludwig et al. does not use a fan in his device because his device is connected to a gas turbine that has a compressor section. Air compressed by the turbine is used to cool the electric machine. While Ludwig et al. does not teach using a fan to cool a generator connected to a gas turbine, he does teach using a fan for motors and generators that don't have access to a source of compressed air. Liebman et al. teaches in his abstract that a heat sink may be a cooling fluid or a material having heat conduction properties. Since Liebman et al. and Mould as modified by Holliday and Ludwig et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have recognized that the cooling fluid driven by the fan or pump of Ludwig et al. acted as a heat sink. Mould et al. as modified by Holliday, Liebman et al. and Ludwig et al. discloses the cooling system for a linear motor but does not disclose a stator temperature sensor combined with a mover temperature sensor where the processor produces a cooling control signal and a driver control signal in response to the sensed temperatures. However Ludwig et al. teaches multiple temperature sensors and mentions the temperature within the gap and the overall temperature of the generator. In column 11 lines 20-29 Holliday teaches cooling both the flux sources and the conductors. In column 7 line 62 to column 8 line 2 Leuthen teaches placing a temperature sensor "in a portion of the variable speed drive system where excess temperature is possible." Since Leuthen and Mould et al. as modified by Holliday, Liebman et al. and Ludwig et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have placed temperature sensors in the heat producing portions of a motor in order to better control the cooling system and thus to increase the efficiency of the motor. Tanaka teaches in column 3 lines 16 ½ to 18 ½ that eddy currents

generated in permanent magnets can produce enough heat to burn the surface of the magnets. Since Tanaka and Mould et al. as modified by Holliday, Liebman et al., Leuthen and Ludwig et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have placed temperature sensors on the magnet portion as well as the conductor portion of a linear motor in order to protect the motor from damage from overheating and also in order to increase the efficiency of the motor. It also would have been obvious for a person of ordinary skill in the art to have placed temperature sensors on the movable as well as the stationary portion of a linear motor because the magnet portions and conductor portions are typically placed with one on the movable portion and one on the stationary portion of the motor. Mould et al. as modified by Holliday, Liebman et al., Leuthen, Ludwig et al. and Tanaka discloses the gantry with the linear motor cooling system but does not disclose an A/D converter for receiving temperature signals and outputting digital signals, a D/A converter for converting a control digital signal to an analog drive signal or an encoder. Senda et al. teaches in column 4 lines 17-22 that a temperature sensor outputs an analog signal that has to be converted to a digital signal before it can be input to a CPU. Since Senda et al. and Mould et al. as modified by Holliday, Liebman et al., Leuthen, Ludwig et al. and Tanaka are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized an A/D converter in the linear motor processor controlled cooling system in order to make the system work properly. Bacchi teaches in column 1 lines 21-31 that digital signals must be converted to analog signals before being used for drive signals. Since Bacchi and Mould et al. as modified by Holliday, Liebman et al., Leuthen, Ludwig et al., Tanaka and Senda et al. are both from the same field of endeavor, it would have been

obvious at the time the invention was made for one of ordinary skill in the art to have utilized a D/A converter in a processor controlled fan motor in order to make the device work properly. Bacchi teaches precision control of a linear motor in column 32-64 by using a closed loop control system and teaches position measurement by using an encoder in column 2 lines 19-28. Since Bacchi and Mould et al. as modified by Holliday, Ludwig et al., Leuthen and Tanaka are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a closed loop control system with an encoder in order to increase the precision of the motor movement and to thus increase the efficiency of the motor system.

Claims 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mould et al. in view of Holliday, Ludwig et al., Leuthen and Tanaka. Mould et al. discloses an X-Y gantry having a linear motor and a processor but does not disclose a temperature sensor attached to the linear motor, a processor configured to receive an input from a temperature sensor and a first cooling device. However Holliday teaches in column 11 lines 20-29 that magnets can be thermally demagnetized and need to be protected from heat. Since Holliday and Mould et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized cooling for a linear motor of a gantry in order to protect the motor from damage and to increase the efficiency of the motor. Mould et al. as modified by Holliday discloses the cooling system for a gantry having a linear motor but does not disclose a temperature sensor or a processor configured to receive an input from a temperature sensor and to compute a difference between a set value and the measured value. Ludwig et al. teaches in column 4 lines 31 ½ to 45 ½ that a processor can be used to control the

cooling of a dynamoelectric machine and teaches temperature sensors. Since Ludwig et al. and Mould as modified by Holliday are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a processor to control the cooling of a linear motor for a gantry in order to cool the motor more efficiently by supplying the precise amount of cooling fluid needed by the motor. Mould et al. as modified by Holliday and Ludwig et al. discloses the cooling system for a linear motor but does not disclose a stator temperature sensor combined with a mover temperature sensor where the processor produces a cooling control signal and a driver control signal in response to the sensed temperatures. However Ludwig et al. teaches multiple temperature sensors and mentions temperature within the gap and overall temperature of the generator. In column 11 lines 20-29 Holliday teaches cooling both the flux sources and the conductors. In column 7 line 62 to column 8 line 2 Leuthen teaches placing a temperature sensor "in a portion of the variable speed drive system where excess temperature is possible." Since Leuthen and Mould et al. as modified by Holliday and Ludwig et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have place temperature sensors in the heat producing portions of a motor in order to better control the cooling system and thus to increase the efficiency of the motor. Tanaka teaches in column 3 lines 16 ½ to 18 ½ that eddy currents generated in permanent magnets can produce enough heat to burn the surface of the magnets. Since Tanaka and Mould et al. as modified by Holliday and Ludwig et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have placed temperature sensors on the magnet portion as well as the conductor portion of a linear motor. It also would have been obvious to

have placed temperature sensors on the movable as well as the stationary portion of a linear motor because the magnet portions and conductor portions are typically placed with one on the movable portion and one on the stationary portion of the motor. In regard to driving a cooling fan or an air valve, see Ludwig et al. column 1 lines 24-31 which teaches that many motors or generators use fans or pumps for cooling. While Ludwig et al. does not use a fan in his device, his device is connected to a gas turbine that has a compressor section. Air compressed by the turbine is used to cool the electric machine. Ludwig et al. does not teach using a fan to cool a generator connected to a gas turbine but does teach using a fan for motors and generators that don't have access to a source of compressed air. Ludwig in column 1 lines 32-38 teaches alternatively using an external air compressor as a source of compressed air. This compressed air would need to controlled by a valve or valves.

Claims 5 and 6 rejected under 35 U.S.C. 103(a) as being unpatentable over Mould et al. in view of Holliday, Ludwig et al., Leuthen, Tanaka and Bacchi 5,053,685. Mould et al. as modified by Holliday, Ludwig et al., Leuthen and Tanaka discloses the method for controlling cooling of a gantry but does not disclose measuring the position or velocity of the mover by using an encoder. Bacchi teaches precision control of a linear motor in column 32-64 by using a closed loop control system and teaches position measurement in column 2 lines 19-28. Since Bacchi and Mould et al. as modified by Holliday, Ludwig et al., Leuthen and Tanaka are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a closed loop control system with position or velocity sensing means in order to increase the precision of the motor movement and to thus increase the efficiency of the motor system. In regard to correcting a movement command in

response to temperature information, see Leuthen column 7 lines 62-64. Since Leuthen and Mould et al. as modified by Holliday and Ludwig et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized speed reduction means based on motor temperature in a linear motor for a gantry in order to protect the motor from damage from excessive heat.

Claims 7- 9, 11, 14, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mould et al. in view of Ludwig et al. and Holliday 5,349,256. Mould et al. discloses an X-Y gantry having a linear motor and a processor but does not disclose a temperature sensor attached to the linear motor, a processor configured to receive an input from a temperature sensor and a first cooling device. However Holliday teaches in column 11 lines 20-29 that magnets can be thermally demagnetized and need to be protected from heat. Since Holliday and Mould et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized cooling for a linear motor of a gantry in order to protect the motor from damage and to increase the efficiency of the motor. Mould et al. as modified by Holliday discloses the cooling system for a gantry having a linear motor but does not disclose a temperature sensor or a processor configured to receive an input from a temperature sensor. Ludwig et al. teaches in column 4 lines 31 ½ to 45 ½ that a processor can be used to control the cooling of a dynamoelectric machine and teaches temperature sensors. Since Ludwig et al. and Mould as modified by Holliday are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a processor to control the cooling of a linear motor for a gantry in order to cool the motor more efficiently by supplying the precise amount of cooling fluid needed by the motor.

In regard to claims 8 and 24, see Ludwig et al. column 1 lines 24-31 which teaches that many motors or generators use fans or pumps for cooling. While Ludwig et al. does not use a fan in his device, his device is connected to a gas turbine that has a compressor section. Air compressed by the turbine is used to cool the electric machine. Ludwig et al. does not teach using a fan to cool a generator connected to a gas turbine but does teach using a fan for motors and generators that don't have access to a source of compressed air.

In regard to claim 9, see Ludwig et al. column 1 lines 32-38.

In regard to claim 11, see Ludwig et al. column 4 lines 39-42.

In regard to claim 14, see Mould et al. figure 2 elements 30 and 34.

Claim 10, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mould et al. in view of Holliday and Ludwig et al. as applied to claim 7 above, and further in view of Emshoff et al. (of record). Mould et al. as modified by Holliday and Ludwig et al. discloses the linear motor cooling system but does not disclose first and second control signals to control first and second cooling systems. Emshoff et al. teaches in column 4 lines 52-67 a first cooling device comprising water flowing in hoses 18 and a second cooling device comprising a coolant gas also cooling the generator with separate sensors for sensing the temperatures of the cooling water and the cooling gas. Since Emshoff et al. and Mould et al. as modified by Holliday and Ludwig et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a second cooling device in a linear motor cooling system in order to cool the linear motor even if one cooling device failed to operate satisfactorily or did not provide sufficient cooling power, thus improving the efficiency of the motor.

In regard to claim 12, see Emshoff et al. column 4 lines 25-31.

In regard to claim 13, see Emshoff et al. column 4 lines 62-67. Since the coolant gas is circulated through the electromagnetic device of Emshoff et al., it cools both the stator and the rotor.

Claims 15, 17, 18 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mould et al. in view of Holliday, Ludwig et al. and Leuthen. Mould et al. as modified by Holliday and Ludwig et al. discloses the cooling system for a gantry linear motor but does not disclose means for reducing the motor speed when the sensed temperature of the motor is above a predetermined temperature. Leuthen teaches this idea is column 7 lines 62-64. Since Leuthen and Mould et al. as modified by Holliday and Ludwig et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized speed reduction means based on motor temperature in a linear motor for a gantry in order to protect the motor from damage from excessive heat.

Claims 16 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mould et al. in view of Holliday, Ludwig et al. and Yabu (of record). Mould et al. as modified by Holliday and Ludwig et al. discloses the cooling system for the linear motor used in a gantry but does not disclose an environmental sensor. Yabu teaches that environmental factors are important for gantry systems used in projection exposure devices and further teaches environmental sensors in the abstract of the patent. Since Yabu and Mould et al. as modified by Holliday and Ludwig et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized

environmental sensors in the linear motor used in a gantry in order to increase the usefulness of the gantry pick and place system by making it usable for environmentally sensitive devices.

Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mould et al. as modified by Holliday, Leuthen and Ludwig et al. as applied to claim 17 above, and further in view of Tanaka 6,069,418. Mould et al. as modified by Holliday, Ludwig et al. and Leuthen discloses the cooling system for a linear motor but does not disclose a stator temperature sensor combined with a mover temperature sensor where the processor produces a cooling control signal and a driver control signal in response to the sensed temperatures. However Ludwig et al. teaches multiple temperature sensors and mentions temperature within the gap and overall temperature of the generator. In column 7 line 62 to column 8 line 2 Leuthen teaches placing a temperature sensor "in a portion of the variable speed drive system where excess temperature is possible." In column 11 lines 20-29 Holliday teaches cooling both the flux sources and the conductors. Tanaka teaches in column 3 lines 16 ½ to 18 ½ that eddy currents generated in permanent magnets can produce enough heat to burn the surface of the magnets. Since Tanaka and Mould et al. as modified by Holliday, Leuthen and Ludwig et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have placed temperature sensors on the magnet portion as well as the conductor portion of a linear motor. It also would have been obvious to have placed temperature sensors on the movable as well as the stationary portion of a linear motor because the magnet portions and conductor portions are typically placed with one on the movable portion and one on the stationary portion of the motor.

In regard to claim 20, it is within the ability of a person of ordinary skill in the art to optimize the desired temperature of magnets and conductors in a linear motor in order to keep the motor operating efficiently and reliably. This includes setting the desired temperature of the magnets and conductors to be the same value. Therefore no patentable weight is given to this limitation.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mould et al. as modified by Holliday and Ludwig et al. as applied to claim 23 above, and further in view of Leuthen and Tanaka. Mould et al. as modified by Holliday and Ludwig et al. discloses the cooling system for a linear motor but does not disclose a stator temperature sensor combined with a mover temperature sensor where the processor produces a cooling control signal and a driver control signal in response to the sensed temperatures. However Ludwig et al. teaches multiple temperature sensors and mentions temperature within the gap and overall temperature of the generator. In column 11 lines 20-29 Holliday teaches cooling both the flux sources and the conductors. In column 7 line 62 to column 8 line 2 Leuthen teaches placing a temperature sensor "in a portion of the variable speed drive system where excess temperature is possible." Since Leuthen and Mould et al. as modified by Holliday and Ludwig et al. are both from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have place temperature sensors in the heat producing portions of a motor in order to better control the cooling system and thus to increase the efficiency of the motor. Tanaka teaches in column 3 lines 16 ½ to 18 ½ that eddy currents generated in permanent magnets can produce enough heat to burn the surface of the magnets. Since Tanaka and Mould et al. as modified by Holliday and Ludwig et al. are both from the same field of endeavor, it would

have been obvious at the time the invention was made for one of ordinary skill in the art to have placed temperature sensors on the magnet portion as well as the conductor portion of a linear motor. It also would have been obvious to have placed temperature sensors on the movable as well as the stationary portion of a linear motor because the magnet portions and conductor portions are typically placed with one on the movable portion and one on the stationary portion of the motor.

Allowable Subject Matter

Claims 3, 21, 22 and 27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record does not disclose or teach a system for cooling the linear motor of a gantry having an encoder, an encoder sensor, an A/D converter for converting analog temperature signals into digital signals, a D/A converter for converting a fan control digital signal to an analog drive signal, a stator with a temperature sensor, a heat sink and a cooling fan, a mover having a second temperature sensor and a heat sink combined with a nozzle connected to an air valve and configured to cool the mover as recited in claim 3. In regard to claims 21 and 27, the prior art of record does not disclose or teach making separate cooling devices for cooling a stator and for cooling a mover combined with the other elements of the claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Judson H Jones whose telephone number is 703-308-0115. The examiner can normally be reached on 8-4:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor Ramirez can be reached on 703-308-1371. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3431 for regular communications and 703-305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

JHJ JHJ
February 8, 2003

Tran Nguyen
TRAN NGUYEN
PRIMARY EXAMINER